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the special sciences deal with special aspects of all things rather than with special groups of things. Again, value admits of and suggests both a structural and a functional analysis, just as the ether does in physics, while the same can not be said with equal propriety of consciousness. Finally, in the world of values the self is either a special form of function, or a structure, just as the atom or any other discrete totality in the physical world is either a special form of change in the ether or a special structure.

Psychology so conceived would comprehend both the conditions and the manifestations of the immediate experience of value, as well as its actual contents. In short, it would include all that it at present includes, and furnish points of easy relationship to both biology and the *Geisteswissenschaften* which depend upon it. Nearly the whole of physiological psychology is comprehended in the antecedents (or conditions) and consequents (or manifestations) of value. The analysis of value and its natural history or growth, taken together, would comprehend a doctrine of elements, a doctrine of combining principles, a description of mental complexes of various types and a doctrine of the self or social consciousness. Indeed, psychology would be very much what Miss Calkins and others conceive it to be. Its definition and some of its terminology alone will have been slightly altered.

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REVIEWS AND ABSTRACTS OF LITERATURE

The Animal Mind. A Text-book in Comparative Psychology. MARGARET FLOY WASHBURN. New York: The Macmillan Company. 1908. Pp. 333.

The study of animal behavior can be attacked from two points of view, the physiological or mechanical, and the psychological. The one has for its aim an immediate mechanical explanation of the phenomena involved, the other an immediate psychological explanation. The former proceeds from known chemical and physical principles and is based upon concepts of matter and energy gravitation, chemical affinity, electricity, etc. The latter proceeds from psychological principles, established in the study of human mental activities, and is based upon concepts of psychic elements. While these two fundamental classes of concepts may eventually prove to be merely different aspects of the same reality, they are, in the present state of knowledge, certainly not mutually exclusive, as some prominent writers would have us believe.

Little is known about either of these classes of concepts. In the last analysis there is as much mysticism connected with the postulates upon which physics and chemistry rest, as there is with those upon which psychology rests. I can, therefore, see no reason for considering research based upon chemicophysical laws in the light of reality, and at the same time relegating those based upon psychic elements to the realm of mysticism, as many are prone to do.

While there is at present no hope of a final explanation of animal behavior, we shall undoubtedly have a clearer understanding of the phenomena involved by attacking the problem from both the mechanical and the psychological point of view than we would have by restricting work to either to the exclusion of the other.

In the last few years there has appeared a considerable number of papers on this subject, some dealing with it from the one, some from the other point of view, and some fortunately comprehensive enough to include both. In "The Animal Mind," the author has reviewed and systematized these papers together with the more important of those of earlier dates, with the idea of bringing together all experimental evidence bearing on mental activities in animals below man.

In the first chapter, dealing with "The Difficulties and Methods of Comparative Psychology," it is pointed out that the only way open to investigate contents of consciousness in minds outside of one's self is to infer the character of mental states and activities from experiences related by means of language and bodily activity under given conditions. Such inference is, of course, more and more questionable as one proceeds from the higher organisms with language, structure, and behavior similar to those of man, to the lower without language and very different in structure and behavior.

In the second chapter, "The Evidence of Mind," the author considers various criteria which have been suggested as tests of consciousness, *e. g.*, response to stimuli, choice, adaptation to an end, variability, "a variation in behavior that shows definitely the result of previous individual experience," ability to learn, rate and kind of learning, and structure. All of these characters are shown to be inadequate in themselves as criteria of consciousness. "We know not where consciousness begins in the animal world. We know where it surely resides—in ourselves—we know where it exists beyond a reasonable doubt—in those animals of structure resembling ours, which rapidly adapt themselves to the lessons of experience. Beyond this point, for all we know, it may exist in simpler and simpler form until we reach the very lowest of living beings." The author does not definitely mention plants in connection with this conclusion. They are, however, included in the phrase, "lowest of living organisms"; and the arguments thus far presented can be applied to plants as well as to animals.

Chapter three is devoted to a comparison between the mental activities in amœba and paramecium, if there be such, and those in man. The author points out that if these simple organisms have a mind at all they can have not more than three or four qualitatively different conscious experiences, while a human being has "several thousand."

In chapters four, five, six and seven, the author deals with sensory discriminations, laying particular stress on the chemical sense and the senses of hearing and vision. The two following chapters are devoted to a consideration of space perception. In discussions on both sensory discrimination and space perception the author begins with the lowest group of animals and proceeds to the higher, briefly reviewing the literature on the subjects under discussion and picturing the mental states and activities of the various groups of animals, assuming in every case that they are conscious.

In chapters ten and eleven, it is shown that modification of behavior occurs in all living organisms. The chief difference between the lower and higher organisms with reference to this is largely a matter of degree and time-rate. In the higher the behavior can be modified much more rapidly and extensively than in the lower.

The final chapters of the book deal with the complicated psychic phenomena, memory, ideas, and attention. The author holds that while the reactions in the lower forms can be adequately explained without assuming "memory in the sense of having ideas of absent objects," the reactions, at least of some of the higher animals, indicate that they are endowed with memory in this sense, although it is a difficult matter to prove.

"Attention, in its simpler form, seems to be met with even in the lowest living organisms; but it seems unlikely that attention in the final form, in which the focus of attention is occupied by an idea or train of ideas, occurs among lower animals. While ideas are probably present to some extent in the minds of the higher mammals, they are hardly so far freed from connection with external stimuli that the animal can shut out the world of sense from its consciousness and dwell in a world of ideas."

In general the author shows that, while experimental evidence proves nothing with reference to the presence of consciousness, it seems to indicate that consciousness may be found in all animals, and that, with reference to complexity, the mental states and activities in animals, including man, form a continuous series from lowest to highest.

"The Animal Mind" is intended primarily as a text in comparative psychology, and it seems well adapted for this purpose; but it will also be found indispensable to all workers in the subject of animal behavior, and ought to be read extensively by physiologists.

The bibliography, consisting of 476 well-chosen titles, will be found valuable. Additional pages dealing with definitions of psychic elements as understood in human psychology would add much to the value of the book from the standpoint of the layman.

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